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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,806	11/26/2003	Osamah M. El Rifai	MIT-135PUS	8192
22494	7590	08/17/2005	EXAMINER	
DALY, CROWLEY, MOFFORD & DURKEE, LLP SUITE 301A 354A TURNPIKE STREET CANTON, MA 02021-2714			ELLIS, SUEZU Y	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 08/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/722,806

Applicant(s)

EL RIFAI ET AL.

Examiner

Suezu Ellis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-18 is/are allowed.
- 6) ☒ Claim(s) 1-15 and 19-35 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on April 1, 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on March 9, 2004 and April 25, 2005 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the cantilever (claims 15, 30, 32) and calibration cantilever (claim 15, 30, 33) or flexible structure (claim 32) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities: On pg. 14, line 3, the word "accurately" is misspelled.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5, 7-9, 15, 30-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5 and 7 recite the limitation "the piezoelectric actuator" in line 3. There is insufficient antecedent basis for this limitation in the claim.

With respect to claim 7, it is unclear if measuring multiple values of the deflection over time corresponds to measuring multiple values within one time period or measuring

at least one value over multiple time periods. For examining purposes, the claim will be treated as measuring at least one value over multiple time periods.

With respect to claim 15, it is unclear if the cantilever recited in line 2 is the same as the calibration cantilever recited in line 9 since the actuator recited in both lines 2 and 9-10 is deemed the same actuator. Please clarify. For examination purposes, the cantilever recited in line 2 is deemed the same as that recited in lines 9-10.

With respect to claim 30, it is unclear if the cantilever recited in line 3 is the same as the calibration cantilever recited in line 10 since the actuator recited in both lines 3 and 9 is deemed the same actuator. Please clarify. For examination purposes, the cantilever recited in line 2 is deemed the same as that recited in line 10.

With respect claim 32, it is unclear if the cantilever recited in line 3 is the same as the flexible structure recited in line 11 since the actuator recited in both lines 3 and 9 is deemed the same actuator. Please clarify. For examination purposes, the cantilever recited in line 2 is deemed the same as that recited in line 11.

With respect to claim 33, the claim language recites the flexible structure being a calibration cantilever. It is unclear if the calibration cantilever is the same as the cantilever described in line 3 of claim 32 since both cantilevers are attached to the same actuator? Please clarify. For examining purposes, the calibration cantilever will be considered the same as the cantilever of claim 32, line 3.

Claims not specifically addressed are indefinite due to their dependency.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-5, 7, 8, 10, 12, 14, 19, 21, 22, 23, 25, 29, 35 and 36, are rejected under 35 U.S.C. 103(a) as being unpatentable over Flecha et al. (US 5,773,824).

Hereinafter, Flecha et al. will be referred to as Flecha.

With respect to claims 1, 3, 19, 21 and 35, Flecha discloses a scanning microscope that comprises a vertical axis controller (first circuit) which provides input signals driving both fast and slow actuators (col. 5, lines 53-54). Note acceleration of the actuator is inherent since acceleration of the actuator is needed to start the movement of the actuator. Further, the fast actuator increases speed, or accelerates, in comparison to the slow actuator. Flecha further discloses a probe detector (second circuit) is used to create an output (deflection value) used to determine new values for deflection of the fast actuator (actuator displacement value) (col. 7, lines 12-14). Flecha discloses a computing system (third circuit) performs the determination of the new values for the deflection of the fast actuator (actuator displacement value). Flecha further discloses the computing system has a storage medium (computer readable medium) having a program stored thereon which operates the vertical axis controller thus begins the cycle of obtaining a deflection value of the cantilever and a deflection value of the actuator displacement (col. 5, lines 55-57; col. 6, lines 56-64). Flecha

teaches a cantilever is attached to the actuator, however fails to expressly disclose the cantilever being flexible. However it is well known in the art that a cantilever to be flexible in order to prevent damage to the sample. Note, although Flecha fails to expressly disclose the scanning probe microscope being a calibration apparatus or the method of calibrating the scanning probe microscope, the scanning probe microscope of Flecha performs the method and comprises the structure as claimed by the applicant, thus is deemed that it can be calibrated via the method of the applicant.

With respect to claims 4 and 22, the modified Flecha discloses the fast actuator is a vertical actuator, thus its displacement would be a vertical displacement (col. 1, lines 12-13).

With respect to claim 5 and 23, the modified Flecha discloses repeating the steps of measuring and determining the different values of the input signal to the actuator to produce vertical displacement values within a predetermined range (Fig. 2; col. 8, lines 4-9). Note the predetermined range is linear portion of the motion range (col. 6, lines 43-45).

With respect to claims 7 and 8, the modified Flecha discloses measuring a value of deflection over time and repeating the step, thus measuring multiple values over time, and determining from the deflection values multiple corresponding values of the piezoelectric actuator displacement (Fig. 2; col. 8, lines 4-9)

With respect to claims 10, 14, 25, 29 and 36, the modified Flecha discloses the slow actuator comprises of a piezoelectric material (col. 5, line 44) and that it is well

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known in the art for the cantilever to comprise of piezoelectric materials (col. 3, lines 59-60).

With respect to claim 12, Flecha discloses it is well known in the technology for a scanning probe microscope to be an atomic force microscope (col. 6, lines 1-5).

Claims 11, 13 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flecha in view of Shivaram et al. (US 6,237,399). Hereinafter, Shivaram et al. will be referred to as Shivaram.

With respect to claims 11, 26 and 28, the modified Flecha addresses all the limitations of claims 1, 3, 19 and 21, however fails to expressly disclose the cantilever comprising piezoresistive elements or capacitive elements. Flecha and Shivaram are directed to a similar field of endeavor of scanning probe microscopes. Shivaram discloses it is well known in the art for cantilevers to comprise of piezoresistors or capacitive elements (col. 3, lines 41-43). It would have been obvious to a person of ordinary skill in the art to modify the cantilevers to comprise of piezoresistors or capacitive elements in order to detect the total motion of the cantilever.

With respect to claim 13, the modified Flecha addresses all the limitations of claims 1 and 3, however fails to expressly disclose the cantilever coated with a magnetic material and the scanning probe microscope comprising a magnetic resonance force microscope. Shivaram discloses it is well known in the art for cantilevers to have magnetic tips to be used in magnetic resonance force microscopy (col. 2, lines 24-26, 55-59). It would have been obvious to a person of ordinary skill in

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the art to modify the scanning probe microscope to be a magnetic resonance force microscope in order to read and map magnetic information on a surface of the sample. Note, although Shivaram fails to expressly disclose the cantilever being coated with a magnetic material, it is functionally equivalent to have a magnetic tip attached to the cantilever since the cantilever can still perform the mapping of the magnetic features of the surface of the sample.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flecha in view of in view of Shivaram and further in view of Takahashi et al. (US 6,049,115). Hereinafter, Takahashi et al. will be referred to as Takahashi.

With respect to claim 27, the modified Flecha addresses all the limitations of claims 19, 21, and 26, however fails to expressly disclose the second circuit of the scanning probe microscope comprising a Wheatstone bridge circuit to measure change in resistance of the piezoresistive elements. Flecha and Takahashi are directed to a similar field of endeavor of scanning probe microscopes. Takahashi discloses it is well known in the art to include a Wheatstone bridge circuit to measure the change in the resistance of the piezoresistive element (col. 1, lines 50-59). It would have been obvious to a person of ordinary skill in the art to include a Wheatstone bridge circuit in order to detect the amount of flexure of the cantilever.

Allowable Subject Matter

Claims 6 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and/or rewritten to overcome the rejection under 35 U.S.C. 112, 2nd paragraph, set forth in this Office.

With respect to claim 6, prior art fails to teach or reasonably suggest a generating calibrating map relating the different input signal values to the corresponding vertical displacement values.

With respect to claim 9, prior art fails to teach or reasonably suggest generating a hysteresis map relating the different input signal values to the multiple corresponding vertical displacement value values.

Claims 15 and 30-34 would be allowable if rewritten or amended to overcome the rejections under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Claims 16-18 are allowed.

With respect to claims 15, 16, 30 and 32, prior art fails to teach or reasonably suggest the controller comprising a map used to adjust input signals to correspond to the vertical displacement values wherein the map comprises a mapping of input signals to the actuator to corresponding vertical displacement values obtained during a calibration by applying input signals and measuring the deflection of the cantilever.

Claims not specifically addressed would be allowable due to their dependency.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chernoff et al. (US 5,825,670) discloses calibrating a scanning probe microscope by measuring the topography (map) of a known calibration sample and comparing the measurement data to the expected data.

Telephone/Fax Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suez Ellis whose telephone number is 571-272-2868. The examiner can normally be reached on 8:30am-7pm (Monday-Thursday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Stephone B. Allen
Primary Examiner